



UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/577,835 05/25/00 PAN

P	M4065.0321/P
EXAMINER	

MM71/0913
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L STREET NW
WASHINGTON DC 20037-1526

MAIL UNIT, C	PAPER NUMBER
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DATE MAILED:

09/13/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/577,835

Applicant(s)

PAN et al.

Examiner

CUONG D NGUYEN

Group Art Unit

2811

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE Three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- ☐ Responsive to communication(s) filed on _____.
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 25-30 is/are pending in the application.
- Of the above claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 25-30 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
 - ☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been received.
 - ☐ received in Application No. (Series Code/Serial Number) _____.
 - ☐ received in this national stage application from the International Bureau (PCT Rule 1.7.2(a)).

*Certified copies not received: _____

Attachment(s)

- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☒ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Interview Summary, PTO-413
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Other _____

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DETAILED ACTION

Claim Rejections - 35 U.S.C. § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

Claim 25 is rejected under 35 U.S.C. 102(b) as being anticipated by Ilderem et al. (US 5,675,166).

Ilderem et al. discloses an integrated circuit comprising: a semiconductor substrate (21) having a surface; a gate dielectric film (24) formed on the surface of the substrate; a gate electrode stack having continuously vertical sidewalls formed on the gate dielectric film, wherein the gate electrode stack including a polysilicon layer (26) on the gate dielectric layer and a silicide layer (44) on the polysilicon layer; nitride spacers (46) formed on the continuously vertical sidewalls of the gate electrode stack other than along a lowermost of the polysilicon layer. See Ilderem et al.'s Fig.10.

Claims 25 and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Jang et al. (US 6,245,620).

Jang et al. discloses an integrated circuit comprising: a semiconductor substrate (21) having a surface; a gate dielectric film (23) formed on the surface of the

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substrate; a gate electrode stack having continuously vertical sidewalls formed on the gate dielectric film, wherein the gate electrode stack including a polysilicon layer (25) on the gate dielectric layer and a metal silicide layer (27) on the polysilicon layer; nitride spacers (33) formed on the continuously vertical sidewalls of the gate electrode stack other than along a lowermost of the polysilicon layer. See Jang et al.'s Fig.9.

Claim Rejections - 35 U.S.C. § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ilderem et al. in view of Bai et al. (US 5,861,340).

Regarding claims 26-28, Ilderem et al. teaches all the limitations of claim 25 as shown above, however Ilderem et al. does not teach that the silicide layer is a refractory metal silicide layer and a diffusion barrier layer formed between the polysilicon layer and the silicide layer.

Bai et al. discloses a semiconductor device comprising: a gate stack (222) including a polysilicon layer (204), a conductive diffusion barrier layer (206, a TiN layer)

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on the polysilicon layer and a refractory metal silicide layer such as cobalt silicide, titanium silicide and platinum silicide. See Bai et al.'s Fig.2C and col.4 lines 16-41.

It would have been obvious to one of ordinary skill in the art to form the silicide layer of refractory metal silicide and to incorporate a conductive diffusion barrier layer between the polysilicon layer and the silicide layer as taught by Bai et al. because of the following reasons:

The silicide of refractory metals such as Ti, Pt and Co are art recognized materials for forming the silicide layer in the semiconductor device because they have very low resistance.

The conductive barrier layer would prevent diffusion of silicon atoms in the polysilicon layer into the silicide layer. See Bai et al.'s col.3 lines 14-18.

Regarding claim 29, the device formed by the combination of Ilderem et al. and Bai et al. has the diffusion barrier layer of TiN which is the same material for forming barrier of present invention. Therefore, Wu et al.'s barrier layer inherently has the same characteristics as claimed device such as the barrier is substantially impermeable to metal atoms.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ilderem et al.

Ilderem et al. does not teach that the spacers have a thickness of 50-500 angstroms. However, the thickness of spacer is an art recognized variable of

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importance which is subject to routine experimentation and optimization. Therefore, it would have been obvious to one of ordinary skill in the art to arrive the spacer having the thickness as claimed.

Response to Arguments

3. Applicant's arguments with respect to claims 25-30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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5. Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

6. Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to CUONG Q NGUYEN whose telephone number is (703) 308-1293. The Examiner is in the Office generally between the hours of 6:30 AM to 5:00 PM (Eastern Standard Time) Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor TOM THOMAS who can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722 or 308-7724.

Any inquiry of a general nature or relating to the status of this application should be directed to the Technology Center Receptionists whose telephone number is 308-0956.

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August 29, 2001

Tom Thomas

**TOM THOMAS
SUPERVISORY PATENT EXAMINER**